IV. ENERGY MANAGEMENT IN VEHICLES AND EQUIPMENT

A. Energy Consumption and Costs for Vehicles and Equipment

Vehicle and equipment energy consists of energy used by equipment ranging in size and function from aircraft carriers to forklifts. It includes aircraft and naval fuels, automotive fuels consumed by Federally-owned and leased vehicles and privately-owned vehicles used for official business, and the energy used in Federal construction.

Table 10 shows that in FY 1996, the Federal Government used approximately 675.1 trillion Btu of energy for vehicles and equipment, a decrease of 27.7 percent relative to FY 1985. DOD's vehicle and equipment energy consumption decreased 29.1 percent from FY 1985, while the civilian agencies increased consumption by 0.6 percent. Overall, vehicle and equipment consumption decreased 1.7 percent from FY 1995. Federal energy consumption in vehicles and equipment is at its lowest level since Federal agencies began reporting consumption in 1975. This is mainly attributable to decreased operations by the Department of Defense.

Jet fuel consumption accounted for 76.0 percent of all vehicle and equipment energy in FY 1996. In FY 1996 compared to the previous year, jet fuel consumption decreased 1.8 percent from 522.3 trillion Btu to 513.0 trillion Btu.

Agencies have taken many tangible steps to keep the use of vehicle fuels to a minimum. For example, USPS continues to modernize its fleet, adding diesel delivery vans and long-life vehicles to its inventory, both of which are more fuel efficient than the older vehicles they replaced. DOD continues to increase the use of flight simulators, as well as the use of new propulsion technologies in order to lessen the growth of vehicle and equipment fuel consumption.

Increased mission activities accounted for higher levels of operations energy use by some agencies. The Commerce Department's significant increase in consumption during FY 1990 was due primarily to increased miles driven by Census personnel in conducting the 1990 Census. Energy consumption in DOC's vehicles has declined by 81.6 percent in FY 1996 from FY 1990.

Other fluctuations in consumption of vehicle fuels resulted from changes in data collection and reporting procedures. The significant decrease in vehicular fuel consumption compared to FY 1985 reported by the Department of Health and Human Services is the result of data collection difficulties which omitted from their reports fuel consumed by leased vehicles and privately-owned vehicles authorized for Government service after FY 1987. HHS reported no vehicles under the agency's control during FY 1990, FY 1991, and FY 1992.

TABLE 10
FEDERAL ENERGY CONSUMPTION IN VEHICLE AND EQUIPMENT OPERATIONS
(In Billions of Btu, with Conversions to Millions of Barrels of Oil Equivalent [MBOE], and Petajoules [Joule x 10^{15}])

CIVILIAN AGENCY	FY 1985	FY 1986	FY 1987	FY 1988	FY 1989	FY 1990	FY 1991	FY 1992	FY 1993	FY 1994	FY 1995	FY 1996	%CHANGE 85-96	%CHANGE 95-96
USPS	11,524.2	11,588.2	11,722.9	11,993.3	12,081.4	12,136.2	12,196.2	12,225.0	12,565.3	13,348.6	14,571.2	14,217.1	23.4	-2.4
DOT	11,957.0	10,706.6	11,457.7	11,036.6	11,414.2	12,150.8	12,350.7	8,702.6	10,769.7	12,917.0	12,193.7	12,222.9	2.2	0.2
USDA	4,319.6	3,242.7	3,648.3	4,300.1	4,783.4	4,952.3	5,123.8	4,982.7	4,931.2	5,129.1	4,821.7	4,654.8	7.8	-3.5
DOJ	2,064.0	2,141.8	2,195.3	1,983.3	2,152.3	2,097.9	2,124.0	3,675.1	2,835.9	3,451.3	3,181.6	3,693.0	78.9	16.1
DOE	2,946.7	2,888.4	2,759.3	2,729.3	2,717.4	2,520.4	2,559.7	2,078.1	2,241.3	2,085.9	1,841.9	1,561.0	-47.0	-15.2
NASA	1,972.7	1,828.1	1,510.8	1,550.1	1,649.9	1,736.7	1,864.0	1,875.4	1,798.0	1,734.9	1,748.6	1,539.9	-21.9	-11.9
TRSY	2,155.0	2,055.1	2,193.3	2,921.9	2,713.2	1,473.2	1,655.7	2,065.2	2,420.9	2,161.8	1,773.4	1,350.9	-37.3	-23.8
DOI	3,053.9	3,105.4	2,967.3	3,097.8	3,075.5	3,352.5	3,208.6	3,819.1	3,507.8	3,970.0	2,782.2	1,347.5	-55.9	-51.6
PCC	530.4	600.0	686.2	629.5	700.3	653.7	578.6	699.6	684.9	688.4	866.7	829.7	56.4	-4.3
VA	592.8	595.5	660.0	630.1	629.4	518.3	317.4	634.9	663.9	374.4	353.6	660.7	11.5	86.8
TVA	578.5	440.6	493.8	480.4	400.8	476.6	534.7	408.8	452.4	480.3	541.7	583.8	0.9	7.8
DOC	1,010.2	1,059.8	1,008.2	1,228.7	1,534.1	3,100.3	1,315.2	952.5	995.7	995.2	760.6	570.1	-43.6	-25.0
DOL	232.2	236.7	250.1	270.4	239.0	239.0	401.9	388.7	369.1	369.6	356.9	337.7	45.4	-5.4
GSA	144.1	134.0	110.7	117.6	109.8	128.1	122.6	102.9	79.6	69.9	91.3	98.8	-31.4	8.3
EPA	132.2	33.0	32.5	37.7	29.4	0.0	0.0	0.0	100.7	97.8	99.5	76.3	-42.3	-23.2
OPM	0.0	0.0	0.0	0.0	0.0	0.0	0.0	12.6	75.2	75.2	75.2	75.2	0.0	0.0
HUD	0.0	0.0	0.0	0.0	0.0	0.0	32.7	33.6	31.6	30.7	25.4	25.4	0.0	0.0
HHS	373.3	331.9	358.4	206.2	204.3	0.0	0.0	0.0	177.3	176.3	105.5	18.6	-95.0	-82.4
FCC	12.4	9.6	11.7	9.3	8.6	9.1	7.2	7.5	7.2	6.6	6.6	4.8	-61.7	-28.0
ST	14.8	16.0	29.7	37.4	38.8	34.9	0.0	0.0	7.5	0.0	0.0	0.0	-100.0	0.0
OTHER*	39.2	51.8	42.3	42.5	67.9	69.6	27.6	101.0	31.5	30.1	44.3	41.7	6.3	-6.0
CIVILIAN AGENCIES TOTAL														
BBTU	43,653.1	41,065.1	42,138.3	43,302.0	44,549.5	45,649.7	44,420.7	42,765.2	44,746.7	48,193.3	46,241.7	43,909.8	0.6	-5.0
DOD	890,679.9	883,768.6	916,766.0	803,594.2	915,445.1	881,345.1	926,033.6	740,357.2	727,887.1	674,597.5	640,893.4	631,202.0	-29.1	-1.5
ALL AGENCIES TOTAL														
BBTU	934,333.0	924,833.7	958,904.3	846,896.1	959,994.5	926,994.8	970,454.3	783,122.4	772,633.7	722,790.8	687,135.1	675,111.8	-27.7	-1.7
MBOE	160.4	158.8	164.6	145.4	164.8	159.1	166.6	134.4	132.6	124.1	118.0	115.9		
Petajoules	985.7	975.7	1,011.6	893.4	1,012.8	977.9	1,023.8	826.2	815.1	762.5	724.9	712.2		

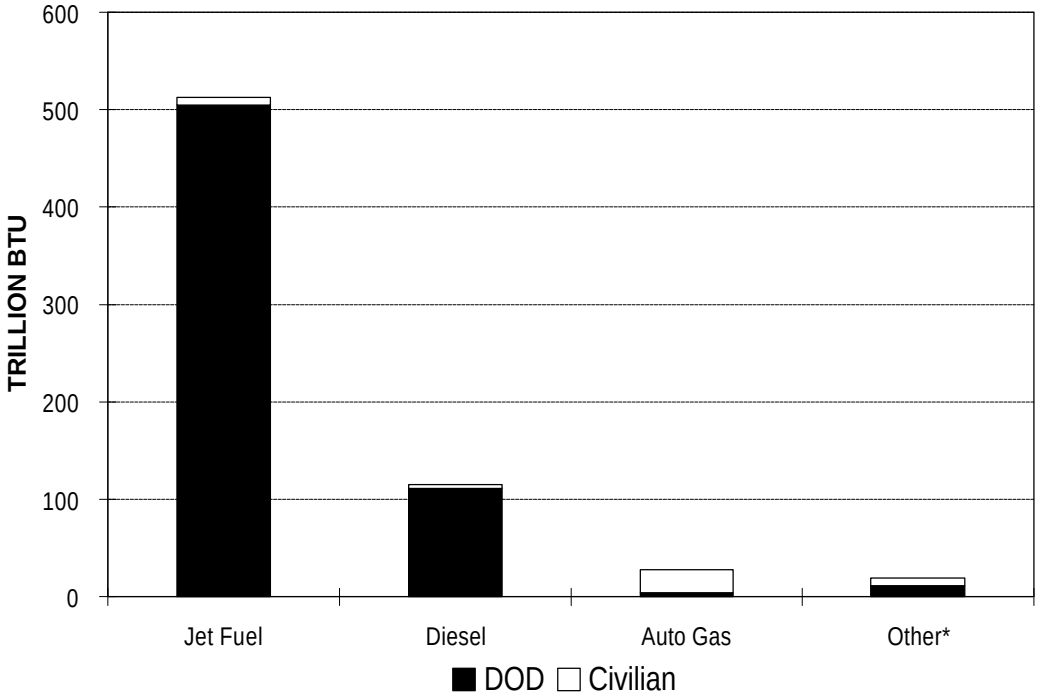
DATA AS OF 12/05/97

*Other includes for certain years the CFTC, CIA, HUD, NSF, NRC, OPM, and USIA.

Note: FY 1996 contains estimated data for the following agency: OPM.
Sum of components may not equal total due to independent rounding.

Source: Federal Agency Annual Energy Management Data Reports

Figure 9
Defense and Civilian Federal Energy Consumption in Vehicles and Equipment by Fuel Type, FY 1996



*Other includes navy special, aviation gas,and LPG/propane

Figure 9 depicts the vehicles and equipment fuel mix within DOD and civilian agencies. Jet fuel accounts for 513.0 trillion Btu or 76.0 percent of the total energy usage in the category, with 17.1 percent attributed to diesel and distillate fuel, 4.1 percent to auto gasoline, and 2.8 percent to aviation gasoline, navy special, LPG/propane and other fuels, combined.

As shown in Tables 11-A and 11-B, the Federal Government spent $3,429.8 million on vehicles and equipment energy in FY 1996, 1.8 percent less than the FY 1995 expenditure of $3,493.4 million constant dollars. In FY 1996, the combined price for all types of vehicles and equipment energy was $5.08 per million Btu, down 0.1 percent from FY 1995. The average real cost of gasoline to the Federal Government increased 4.1 percent from $0.99 per gallon in FY 1995 to $1.03 per gallon in FY 1996. The unit cost for diesel/distillate fuel decreased 6.5 percent while the unit cost for jet fuel rose just 0.5 percent.

When compared to FY 1985 using constant 1996 dollars, energy costs for vehicles and equipment decreased 59.6 percent from $8,481.3 million to $3,429.8 million in FY 1996. During that same period, the Government's combined cost for vehicles and equipment energy, in constant dollars, fell 44.0 percent from $9.07 per million Btu to $5.08 per million Btu.

Vehicle and equipment fuel costs in FY 1996 represent 44.6 percent of the Government's total energy costs of $7.7 billion.

TABLE 11-A
DEFENSE AND CIVILIAN FEDERAL COSTS FOR VEHICLE AND EQUIPMENT ENERGY IN FY 1996
(In Millions of Dollars)

	AUTO GAS	DIST. DIESEL	LPG/ PROPANE	AVIATION GAS	JET FUEL	NAVY SPECIAL	OTHER	TOTAL
DEFENSE	15.028	458.338	0.000	0.034	2,542.230	0.000	74.859	3,090.489
CIVILIAN	211.734	28.760	0.187	3.361	57.981	0.000	37.289	339.312
TOTAL	226.762	487.098	0.187	3.395	2,600.211	0.000	112.148	3,429.801

AVERAGE COST PER UNIT, BASED ON REPORTS FROM AGENCIES

AUTO GAS	=	1.03	/	GALLON
DIST/DIESEL	=	0.58	/	GALLON
LPG/PROPANE	=	0.81	/	GALLON
AVIATION GAS	=	1.76	/	GALLON
JET FUEL	=	0.66	/	GALLON
NAVY SPECIAL	=	0.00	/	GALLON
OTHER	=	6.00	/	MILLION BTU

DATA AS OF 12/05/97

Note: Contains estimated data for the following agency: OPM.
Sum of components may not equal total due to independent rounding.

Source: Federal Agency Annual Energy Management Data Reports

TABLE 11-B
CONSUMPTION AND COSTS OF VEHICLE AND EQUIPMENT ENERGY BY FUEL TYPE IN FY 1996, FY 1995, AND FY 1985
(Constant 1996 Dollars)

ENERGY TYPE	BILLIONS OF BTU	COST PER MMBTU	COST (IN MILLIONS OF DOLLARS)
FY 1996			
AUTO GASOLINE	27,562.9	8.2271	226.762
DIST/DIESEL	115,619.2	4.2130	487.098
LPG/PROPANE	22.1	8.4875	0.187
AVIATION GASOLINE	241.4	14.0637	3.395
JET FUEL	512,969.1	5.0689	2,600.211
NAVY SPECIAL	0.0	0.0000	0.000
OTHER	18,697.1	5.9982	112.148
TOTAL	675,111.8		3,429.801
COMBINED COST PER MMBTU = $5.080			
FY 1995			
AUTO GASOLINE	31,905.4	7.9041	252.191
DIST/DIESEL	122,805.9	4.5054	553.283
LPG/PROPANE	29.3	5.1993	0.152
AVIATION GASOLINE	319.3	12.3902	3.956
JET FUEL	522,264.5	5.0427	2,633.633
NAVY SPECIAL	1,391.7	6.8961	9.597
OTHER	8,418.7	4.8170	40.554
TOTAL	687,134.7		3,493.366
COMBINED COST PER MMBTU = $5.084			
FY 1985			
AUTO GASOLINE	50,484.7	10.5736	533.772
DIST/DIESEL	169,412.1	8.4382	1,427.898
LPG/PROPANE	149.4	9.8074	1.464
AVIATION GASOLINE	1,882.3	15.6196	29.400
JET FUEL	705,675.5	9.1185	6,434.628
NAVY SPECIAL	6,695.9	7.8255	52.334
OTHER	238.6	7.5439	1.800
TOTAL	934,538.5		8,481.298
COMBINED COST PER MMBTU = $9.077			

DATA AS OF 12/05/97

Note: FY 1996 contains estimated data for the following agency: OPM.
FY 1995 contains estimated data for the following agencies: FCC and OPM.
Sum of components may not equal total due to independent rounding.

Source: Federal Agency Annual Energy Management Data Reports

B. Progress Toward the Reduction Goals for Gasoline and Diesel Consumption

Section 10 of Executive Order 12759 established an energy-efficiency goal for Federal vehicles. Each agency operating at least 300 commercially designed motor vehicles domestically is directed to develop a plan to reduce gasoline and diesel consumption by at least ten percent by FY 1995 in comparison to FY 1991. GSA, in consultation with DOE, issued guidance on October 14, 1992, to assist agencies in meeting this goal. Although the goal period for this requirement is past, this report will continue to track progress against the FY 1991 base year.

Table 12 shows that of the agencies reporting gasoline consumption, the level of consumption overall decreased 19.3 percent from 273.2 million gallons in FY 1991 to 220.5 million gallons in FY 1996.

Of the agencies reporting consumption of diesel fuel, the overall level of consumption decreased 25.6 percent from 1,120.1 million gallons in FY 1991 to 833.6 million gallons in FY 1996. DOD's 25.2 percent decrease in diesel consumption is the main contributing factor in this decrease. The high level of diesel consumption by DOD during FY 1991 is attributed to Desert Shield/Desert Storm operations. Diesel consumption data may include other types of off-road vehicles and equipment, in addition to on-road passenger cars and trucks.

Section 11 of the Executive Order establishes requirements for the acquisition of alternative fuel motor vehicles by the end of model year 1995. Agencies electing to use these vehicles receive credit toward meeting the vehicle energy efficiency goal. Information on Federal Government activities related to alternative fuel vehicles is included in the next section of this report.

TABLE 12
FEDERAL AGENCY PROGRESS TOWARD THE GOALS OF SECTION 10 OF EXECUTIVE ORDER 12759, FY 1991 and FY 1996

GASOLINE CONSUMPTION
(THOU. OF GALLONS)

AGENCY	1991	1996	%CHANGE
USPS	72,152.0	98,191.0	36.1
USDA	37,949.6	34,270.0	-9.7
DOD	95,958.0	26,586.0	-72.3
DOJ	14,260.1	21,265.7	49.1
DOE	9,439.7	8,031.9	-14.9
DOI	17,834.8	7,548.5	-57.7
VA	2,094.0	4,432.0	111.7
DOT	5,500.8	4,278.4	-22.2
TRSY	5,666.7	3,736.1	-34.1
TVA	2,234.0	3,269.8	46.4
DOL	3,215.0	2,700.6	-16.0
NASA	2,576.0	1,919.0	-25.5
DOC	2,525.0	1,572.4	-37.7
GSA	980.5	773.0	-21.2
OPM	0.0	601.7	0.0
EPA	0.0	548.7	0.0
PCC	335.9	224.2	-33.3
HUD	261.5	203.5	-22.2
HHS	0.0	111.9	0.0
CIA	0.0	101.4	0.0
USIA	90.1	84.7	-6.0
FCC	55.8	37.1	-33.5
NRC	35.5	15.4	-56.6
TOTAL	273,167.4	220,503.0	-19.3

DIESEL CONSUMPTION
(THOU. OF GALLONS)

AGENCY	1991	1996	%CHANGE
DOD	1,073,084.0	802,536.0	-25.2
USPS	22,907.0	14,010.0	-38.8
PCC	3,869.0	5,780.1	49.4
USDA	2,201.7	2,232.8	1.4
DOC	6,637.1	2,048.0	-69.1
DOI	1,514.2	1,688.4	11.5
DOE	6,067.8	1,622.0	-73.3
TVA	1,791.0	1,136.1	-36.6
DOJ	775.2	833.9	7.6
VA	401.0	769.0	91.8
NASA	644.0	652.0	1.2
USIA	81.5	88.2	8.2
DOT	94.8	73.2	-22.8
TRSY	61.8	39.8	-35.6
HHS	0.0	32.0	0.0
CIA	0.0	28.8	0.0
EPA	0.0	20.6	0.0
FCC	1.7	0.9	-47.1
NRC	1.2	0.3	-75.0
TOTAL	1,120,133.0	833,592.1	-25.6

DATA AS OF 12/05/97

Note: FY 1996 contains estimated data for the following agencies: FCC and OPM.
Sum of components may not equal total due to independent rounding.

Source: Federal Agency Annual Energy Management Data Reports

C. Alternative Fuel Vehicles

An alternative fuel vehicle (AFV) can be manufactured as an AFV or converted to an AFV as either a bi-fuel, flexible fuel, or dedicated vehicle. A bi-fuel vehicle has the ability to operate on either an alternative fuel or gasoline, whereas a flexible fuel vehicle has the ability to operate on a mixture of alternative fuel and petroleum-based fuels. Dedicated vehicles are designed to operate only on alternative fuel. The alternative fuels currently used by Federal agencies are: M-85 (85 percent methanol, 15 percent gasoline), E-85 (85 percent ethanol, 15 percent gasoline), CNG (compressed natural gas), LNG (liquified natural gas), LPG (liquified petroleum gas), and electricity.

Sections 301 to 311 of Title III of EPACT contain provisions affecting Federal fleets. These sections of EPACT expand and confirm the activities and goals of section 11 of Executive Order 12759. Executive Order 12759, section 11, requires that the Federal Government acquire the maximum number practicable of AFVs. To meet the requirements of Executive Order 12759, each Federal agency has developed a five-year plan for introducing AFVs into its fleet. Section 303 of EPACT, 42 U.S.C. § 13212, mandates the fleet requirements for new acquisitions to the Federal fleet listed in the first column of the following table. With the Executive Order 12844 of April 21, 1993, the President has established even more aggressive goals for increased AFV usage. Under this Executive Order, each agency should exceed EPACT requirements by 50 percent for FY 1993 through 1995. The Federal fleet targets under this order are listed below.

AFV Requirements for New Acquisitions in Federal Fleet

Fiscal Year	EPACT	Executive Order 12844
FY 1993	5,000	7,500
FY 1994	7,500	11,250
FY 1995	10,000	15,000
FY 1996	7,150[14]	N/A
FY 1997	9,500	N/A

Section 308 of Title III of EPACT, 42 U.S.C. § 13217, requires agencies to measure the aggregate percentage of alternative fuel use in dual-fueled vehicles in their fleets. Some agencies have experienced difficulties in collecting this information. During FY 1996, 11 agencies reported 1,228 dedicated alternative fuel vehicles and 14,668 dual fuel vehicles in their fleets. Of these 11 agencies, four were unable to report consumption of alternative fuels in their vehicles. In an effort to better fulfill this reporting requirement, vehicle fleet managers and representatives from DOE, GSA, and other agencies conducted coordinating meetings over the last year on this issue. These meetings resulted in a revised GSA Agency Report of Motor Vehicle Data (form SF-82) for collecting acquisition, fuel consumption, and fuel cost data for non-tactical motor vehicles. The revised SF-82 will be distributed by GSA to agency fleet managers beginning in FY 1997. GSA

[14]These figures based on GSA estimates of approximately 28,000 annual vehicle acquisitions by EPACT-covered Federal fleets. Section 303 of the EPACT states that 25 percent of all new acquisitions in 1996 and 33 percent in 1997 must be AFVs.

will compile this data, including alternative fuel consumption data reported under Sections 303 and 308 of EPACT, and forward this information to DOE for inclusion in the Annual Report to Congress.

Through its Interagency Fleet Management System (IFMS) and the Automotive Center, the General Services Administration plays a key role in the implementation of AFV legislation. GSA provides vehicles and support services to other Federal agencies through the IFMS. The IFMS accounts for approximately 25 percent of the total Federally-owned inventory of 550,000 vehicles and 75 percent of the annual Federal light duty vehicle acquisitions. During FY 1996, GSA's Automotive Center procured 1,541 AFVs; the types and models of these are shown below.

FY 1996 AFV Purchases by GSA's Automotive Center

Make and Model	Fuel	Number Purchased
Ford Taurus Mid-Size Sedan	M85 Flexible Fuel	9
Ford Taurus Mid-Size Sedan	E85 Flexible Fuel	1,132
Chrysler Eight-Passenger Van	CNG Dedicated	10
Various Makes and Models	CNG Bi-Fuel	249
Chrysler Minivan/ General Motors S10 Pickup	Electricity	141

The GSA Automotive Center is the central source for establishing Federal contracts with manufacturers for the purchase of vehicles. The Center handles the acquisition of all light and medium duty vehicles for all Federal agencies, including the IFMS. The Center, as part of its effort under the Alternative Motor Fuels Act (AMFA), developed specifications and procurement descriptions for the acquisition of AFVs with original equipment manufacturers (OEM).

The U.S. Postal Service continues to operate the largest CNG fleet in the country and has exceeded 1996 Federal EPACT requirements for purchasing alternatively fueled vehicles. Since 1989, more than 7,000 vehicles have been converted to compressed natural gas. Most USPS AFVs are dual-fueled (gasoline and CNG) and it plans to continue converting more vehicles to dual-fuel CNG. USPS has also been investigating the use of electric vehicles in joint efforts with the Department of Energy and under contract with Ford Motor Company and General Motors Corporation-Hughes. It plans to convert an additional 20 vehicles from gasoline to electric for delivery in 1997. The USPS also is testing a small group of ethanol powered vehicles. Its engineering staff, in cooperation with other federal agencies and private industry, continues to evaluate electric and alternative fuel technologies as they become available.

The Department of Energy has made efforts to provide the private and public sector with information on issues concerning AFVs. An Alternative Fuels Hotline (1-800-423-1DOE) was established in June 1992 to provide callers from Federal agencies, industry and the public with answers to questions on AFVs. By calling the toll free number, callers can request information on AFVs. In 1996, 6,725 calls were received. Many callers had questions concerning the purchase

and conversion to of AFVs, EPACT and Clean Air Act requirements, funding and tax incentives, and training and safety issues.

The Alternative Fuels Data Center (AFDC), which is located at the National Renewable Energy Laboratory (NREL) in Golden, Colorado, may be accessed by the public on the Internet at http://www.afdc.nrel.gov. The site was accessed approximately 603,000 times in 1996, indicating a growing public interest in alternative fuels. The AFDC is the central repository for data from DOE's alternative fuel vehicle demonstration programs. The AFDC stores data on demonstration programs that receive funding support authorized by the AMFA of 1988. Information collected and provided by the AFDC includes:

- data on 600 government fleet vehicles;
- refueling site information for CNG, LPG, Ethanol, and Methanol;
- information on emissions, mileage, fuel economy;
- information on emissions, for flexible fuel vehicles running on alcohol fuels and gasoline;
- repair and maintenance logs for alternative fuel fleet vehicles;
- heavy duty and transit bus data on performance, emissions, fuel economy, and mileage;
- data on the Clean Fleet Program - run by Federal Express and South Coast Air Quality Management District (a controlled comparative study of operating data from gasoline vehicles and different types of alterative fuels).

Federal efforts to expand deployment of AFVs were boosted by the Clean Cities Program during FY 1996. The Clean Cities Program, initiated by the DOE in September 1993, is a voluntary program designed to increase fleet vehicle alternative fuel use by encouraging partnerships between fuel suppliers, vehicle manufacturers, fleet managers, and Federal, State, and local government agencies. DOE supports Clean Cities participants through the placement of Federal vehicles and by maintaining a national hotline and a support staff member at each of its ten regional support offices, which provide local assistance concerning federal and State requirements for AFV acquisitions and conversions and assist local Clean Cities with their alternative fuels market development. In 1996, nine new cities were awarded the Clean Cities designation, for a total of 53 Clean Cities. DOE has established a number to handle inquiries from cities interested in joining the program: 1-800-CCITIES. The program's Internet address is http://www.ccities.doe.gov.